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Identifying the Determinants of Interest Rate Risk of the Banks: A Case of Turkish Banking Sector

Serhat Yüksel

Asst. Prof. of International Trade and Management, Konya Food Agriculture University, serhat.yuksel@gmail.com

Sinemis Zengin

Ph.D. in Banking, sinemis.zengin@gmail.com

Abstract

In this study, we aimed to explain the influencing factors of interest rate risk in Turkish banking sector. Within this scope, 20 deposit banks in Turkey were evaluated. Furthermore, annual data for the periods between 2006 and 2015 was analyzed by using panel logit method. According to the results of this analysis, it was identified that 2 explanatory variables affect interest rate risk of Turkish banks. First of all, it was determined that banks, which have higher amount of deposits, are exposed to higher amount of interest rate risk. In addition to this situation, it was also defined that there is a negative relationship between the amount of capital and interest rate risk. As a result of this issue, it was recommended that Turkish banks should increase capital amount in order to manage interest rate risk more effectively.

Keywords: *Banking; Interest Rate Risk; Turkey; Risk Management; Basel Committee*

JEL classification*: C25, G21, G32*

Introduction

Banks play an intermediary role between depositors and investors. Owing to this aspect, depositors can gain interest for their savings and investors can reach sources much easily. Therefore, it can be said that they play a crucial role in order to provide the sustainability of the economy (Freixas ve Rochet, 2008) Because of this issue, the popularity of the banks increased very much especially after globalization. However, in addition to the increase in the popularity, there is also increase in the risks which should be managed by the banks.

The main risks in the banking sectors can be classified as credit risk, market risk and operational risk. Credit risk refers to the possibility that customers cannot pay their loans back to the bank. In addition to the credit risk, market risk means that banks make loss due to the volatility in the market. Moreover, operational risk includes the risks other than credit and market risk. It mainly contains four different aspects, which are people, system, process and external factor (Van Den Brink, 2002).

Interest rate risk is a type of market risk which means that banks get loss owing to the changes in market interest rate (Chorafas, 1999). This is such an essential type of risk that banks may make astronomical loss if interest rate risk is not managed effectively. Generally, the deposits of the banks are short term whereas loans given to the customers have longer maturity. Because of this situation, any increase in interest rate causes loss for the banks. The main reason behind this issue is that banks will start to pay higher amount of interest to the depositors, but there will be no change in interest amount paid by the debtors to the bank (Angbazo, 1997).

In the past, there were many banks that had loss due to the interest rate risk. For example, during banking crisis occurred in Turkey in 2000, interest rates increased dramatically (Oktar and Yüksel, 2015). Owing to this increase, banks, which hold too much treasury bills at that time, made a significant loss. The reason for this problem is that those banks do not consider interest rate changes by investing most of their sources to treasury bills (Alper, 2001). Thus, it is obvious that interest rate risk should be managed by the banks effectively.

There are many studies in the literature which analyzed interest rate risk in banking sector. Most of them were related to identify the determinants of interest rate risks (Hutchison and Pennacchi, 1996), (Duan and Simonate, 2002), (Ahmed et. al., 1997). As a result of this analysis, they could suggest some strategies so as to decrease interest rate risk. Additionally, some other studies also concluded that interest rate risk should be managed together with credit and liquidity risks (Alessandri and Drehmann, 2010), (Esposito et. al., 2015). Owing to this analysis, it will be possible to recommend some actions in order to manage interest rate risk more effectively. As a result of these aspects, it can be said that the studies related to the interest rate risk are essential.

While taking into the consideration of this issue, in this study, we try to identify the determinants of interest rate risk in Turkish banking sector. We make a regression analysis by using logit method so as to achieve this objective. According to the results of this analysis, it will be possible to understand the reasons of interest rate risk and make suggestion in order to decrease this risk.

The paper is organized as follows: after introduction part, we describe the definition of interest rate risk, different methods to calculate this risk and similar studies in the literature in the second part. Furthermore, the third part provides research and application to identify the determinants of interest rate risk in banking sector. Finally, the results of the analysis are given at conclusion.

Interest Rate Risk in Banking Sector

Interest rate risk refers to the probability that banks get loss due to the changes in market interest rate (Hellwig, 1994). The deposits of the banks are short term whereas the loans given to the customers have longer maturity. Therefore, any increase in interest rates causes problems for banks. In other words, banks have to pay higher interest to the depositors after maturity date in case of rising interest rates. However, there is no change in interest revenue obtained from the loans given to the customers (Stanton, 1997).

There are mainly two different methods in order to measure interest rate risks of the banks. The first method is GAP analysis that examines how interest rate changes affect the balance sheet of the banks. Therefore, first of all, interest sensitive accounts in assets and liabilities should be defined. After that, the ratio of assets and liabilities is calculated (Kim and Koppenhaver, 1993). This ratio is also named as “GAP ratio”. If this ratio is higher “1”, this means that assets are more sensitive to interest rate changes rather than liabilities. On the other side, when this ratio is less than “1”, it implies that changes in interest rate affect liabilities more than assets. Owing to this analysis, it will be possible

for banks to take actions for their balance sheet positions so as to manage interest rate risk more effectively.

Another important point in GAP analysis is that interest rate sensitive assets and liabilities of the banks are analyzed according to their maturities (Bacha, 2004). In other words, these assets and liabilities are classified with respect to different due dates. After that, the results are obtained for each maturity. Therefore, it will be possible to analyze interest rate risk of the banks for different times. Owing to this analysis, banks can implement various strategies for different due dates (Houpt and Embersit, 1991).

Another method for measuring interest rate risk is duration analysis. It analyses how interest rate changes affect the present value of the investments (Macaulay, 1938). In this analysis, firstly, duration of the assets and liabilities of the banks are calculated for different maturities. The situation in which the duration of assets is higher than the liabilities shows that assets of that bank are more sensitive to the fluctuations in interest rates. Therefore, for this situation, if this bank expects any increase in interest rates, it will prefer to save remaining positions because the values of the assets will rise. Moreover, this bank should change the structure of its balance sheet if there is an expectation for interest rate to go down in the future (Bierwag ve Kaufman, 1985).

On the other hand, if the duration of the liabilities is higher than assets, it means that liabilities of the banks are more interest rate sensitive. In this case, any increase in interest rate will cause loss for this bank. The main reason behind this situation is that the debt of the banks will go up when there is an increase in interest rate. Similar to this issue, if this bank expects that interest rate will decrease in the future, it does not prefer to change its balance sheet position (Kaufman, 1984). There are a lot of studies related to interest rate risk in the literature. Some of them were emphasized on the table below.

Table 1: Studies Related to Interest Rate Risk

Author	Scope	Method	Variables	Results
Van Horne (1965)	USA	Multiple Regression	Derivatives, forward rates	It was determined that the deviation in forward rates affect interest rate risk.
Kaufman (1984)	Literature Review	Simulation	Total assets, total deposits, net profit	He concluded that interest rate risk is high if assets of the bank are less interest sensitive than its deposits
Hanweck and Kilcollin (1984)	USA	Regression	Total assets, return on assets	It was determined that the profitability and size of the banks affect their interest rate risk.
Lai and Hwang (1993)	USA	Linear Programming	Total assets, total deposits, total loans, price of futures contract	They concluded that derivatives, loans and deposits affect interest rate risk of the banks.
Madura and Zarruk (1995)	USA	Regression	Total capital, international interest rates	It was determined that international interest rates and capital amount are significant indicators of interest rate risk.
Hutchison and Pennacchi (1996)	200 commercial banks	Survey	Total deposits, changes in deposit rate	They defined that deposit rate is an important determinant of interest rate risk.
Ahmed et. al. (1997)	USA	Panel Data Analysis	Total assets, net interest margin, non-performing loans, total capital, derivatives, ownership type	They reached a conclusion that the level of interest rate risk is directly related to liquidity and indirectly related to banks size and derivatives.
Hirtle (1997)	USA	Regression	Total assets, total deposits, savings, foreign deposits, mortgage loans, derivatives	It was analyzed that derivatives play an important role in order to define interest rate risk.
Shanker (1998)	USA	Regression	Total assets, derivatives	It was concluded that banks, which use more derivatives, are subject to less interest rate risk.
Alessandrini (1999)	USA	Regression	Total deposits, total assets, total loans, non-performing loans, total capital	It was identified that there is a negative relationship between credit growth and interest rates.
Faff and Howard (1999)	Australia	Simulation	Net interest margin, total assets	They concluded that large banks are more sensitive to interest rate risk.

Oertmann et. al. (2000)	European Union	Simulation	Total capital, return on asset, international interest rate	They reached a conclusion that international interest rate is an important indicator of interest rate risk.
Duan and Simonate (2002)	USA	Monte Carlo	Total deposit, deposit insurance	They determined that there is a negative relationship between deposit insurance and interest rate risk.
Jaffee (2003)	Fannie Mae and Freddie Mac	Simulation	Mortgage loans, total capital, loss in market value, return on asset	It was identified that mortgage portfolio does not create interest rate risk.
Boehm and Ehrhardt (2003)	USA	Descriptive Statistics	Total loans, mortgage loans	They identified that the interest rate risk of a reverse mortgage is greater than that of either a typical coupon bond or a regular mortgage.
Staikouras (2003)	USA	Simulation	Net interest margin, common stock returns, changes in economic regimes, return on asset, inflation rate	It was determined that there is an inverse relationship between interest rate changes and common stock returns of financial institutions.
Fraser and Madura (2003)	USA	Regression	Total stocks, return on asset, total assets, total deposits, total capital	They defined that there is a negative relationship between bank returns and changes in interest rates
Beets (2004)	Literature Review	Simulation	Derivatives, total assets, total deposits, change in rand value of futures contract, cash outflows from balance sheet financing	It was defined that interest rate risks can be controlled by using derivatives.
Bacha (2004)	Malaysia	Regression	Total loans, net cost of funds, international interest rate, total assets, total deposits, return on asset, growth rate	He concluded that similar to the conventional banks, Islamic banks are also subject to interest rate risk.
Sierra and Yeager (2004)	USA	Regression	Non-performing loans, total assets, total deposits, net interest margin, return on asset, total capital	They reached a conclusion that there is a relationship between credit risk and interest rate risk.
Angbazo (2007)	USA	Regression	Net interest margin, derivatives, non-performing loans	It was identified that net interest margins of commercial banks reflect both default and interest-rate risk premium.
Brewer et. al. (2007)	USA	GARCH	Total assets, interest-sensitive cash flows, total deposits, total capital	They defined that there is a negative relationship between size and interest rate risk.
Vickery (2008)	USA	Probit	Cash flows, interest expense, total assets, number of firms, unemployment rate, return on asset,	It was defined that firms with higher size are subject to more interest rate risk.

			short term debt, total loans, type of the banks	
Drehmann et. al. (2008)	England	Simulation	Total assets, total capital, non-performing loans, return on assets, total loans, total deposits, derivatives	It was concluded that it is fundamental to assess the impact of interest rate and credit risk jointly.
Alessandri and Drehmann (2010)	England	Simulation	Total capital, total assets, non-performing loans, total loans	They developed a model in which credit and interest rate risk are measured together.
Drehman et. al. (2010)	England	Simulation	Non-interest loans, total assets, total deposits	They reached a conclusion that the impact of credit and interest rate risk should be measured jointly.
Schröder and Dunbar (2011)	USA	Descriptive Statistics	International interest rate, derivatives, interest rate swap, return an asset	It was determined that derivatives are very useful in order to hedge interest rate risk.
Memmel (2011)	Germany	Descriptive Statistics	Changes in banks' market value, return on assets	It was defined that changes in earnings have a large impact on interest income.
Bagenau et. al. (2012)	USA	Regression	Derivatives	It was concluded that there is a negative relationship between derivatives and interest rate risk.
Nawalkha and Soto (2012)	USA	M-Absolute/M-Square model	Non-performing loans, derivatives, total loans, total deposits, inflation rate	They determined that there is a correlation between interest rate risk and default risk.
English et. al. (2013)	USA	Regression	Stock price, total assets, total deposits, total loans, commercial loans, consumer loans, derivatives	They concluded that bank stock price decline increases interest rate risk.
Ivanovski et. al. (2013)	Macedonia	Descriptive Statistics	Treasury bonds, international interest rate	It was concluded that treasury bonds are not sensitive on interest rate risk.
Akhtaruzzaman et. al. (2014)	USA and Australia	GARCH	Stock return, return on asset, international interest rate, net capital flows	It was concluded that there is a correlation between interest rate risk and stock return of the banks
Memmel (2014)	Germany	Simulation	Banks' market value, type of the banks, total assets, interest income, net interest margin	It was identified that changes in banks' market value and interest rate risk are highly correlated.

Yang et. al. (2014)	13 EU countries	Covariance Model	Short-term debt, international interest rate	They defined that the interest rate risk is severe for European countries with greater debt problems.
Bednar and Elamin (2014)	USA	Descriptive Statistics	Total loans, securities, total assets, percentage change in economic value, return on asset	It was determined that increase of interest rate risk at small banks is more dramatic.
Abdymomunov and Gerlach (2014)	USA	Simulation	Total capital, net interest margin, total assets, total deposits	They made a stress test to US banks with respect to interest rate risk.
Papadamoua and Siriopoulos (2014)	England	GARCH	Return on asset, dummy for the financial crisis, volatility of stock returns, international interest rate, exchange rate	They determined that macroeconomic uncertainty raises interest rate risk.
Vuillemey (2015)	USA	Regression	Derivatives, total loans, total capital, corporate tax rate, liquid assets/total assets, return on asset	It was concluded that the usage of derivatives decreases interest rate risk.
Esposito et. al. (2015)	Italy	Panel Data Analysis	Total assets, non-performing loans, total capital, total loans/total assets, return on asset, derivatives	They found that the interest rate risk was significantly correlated to liquidity risk.
Landier et. al. (2015)	USA	Regression	Net interest margin, return on asset, interest income, non-interest income, capital, market value of equity, total assets, short term debt	They concluded that income gap is significant determinant of interest rate risk for the banks.
Campos et. al. (2016)	USA	Regression	Total assets, international interest rate, stock market return, growth rate, return on asset	They defined that there is a positive relationship between the size and interest rate risk.

Source: *Authors*

As it can be seen from the table above, most of the studies concluded that derivative is an important tool for the banks so as to cope with interest rate risks. Within this scope, Lai and Hwang (1993), Hirtle (1997), Shanker (1998), Schröder and Dunbar (2011), Bagenau and others (2012) and Vuillemey (2015) reached this conclusion for US banks by using different methods. Additionally, there are also some studies which identified that international interest rates are significant indicators of interest rate risk (Madura and Zarruk, 1995), (Oertmann et. al., 2000).

Alessandrini (1999) used regression analysis in order to identify the determinants of interest rate risk for US banks. According to the results of this analysis, it was determined that there is a negative relationship between credit growth and interest rates. Sierra and Yeager (2004) also reached the similar results by using the same approach. Furthermore, Drehmann and others (2008) also came to the same conclusion for English banks.

Hanweck and Kilcollin (1984) and Campos and others (2016) made a study in order to analyze the determinants of interest rate risk in US banks. They used regression analysis in order to reach this objective. As a result of this analysis, they concluded that the size of the banks affect their interest rate risk. In addition to these studies, Ahmed and others (1997), Faff and Howard (1999), Brewer and others (2007) and Vickery (2008) reached similar results by using different techniques.

In addition to these aspects, it was seen that in the past, some of the studies are related to determine the influencing factors of interest rate risks (Van Horne, 1965), (Kaufman, 1984), (Hanweck and Kilcollin, 1984), (Lai and Hwang, 1993), (Madura and Zarruk, 1995), (Hutchison and Pennacchi, 1996), (Ahmed et. al., 1997), (Duan and Simonate, 2002). After that, the concept of the studies started to determine the ways how to hedge interest rate risks. Within this context, Beets (2004) defined that interest rate risks can be controlled by using derivatives.

Moreover, recent studies related to interest rate risk emphasized that this risk should be managed together with other types of risks. Within this scope, Alessandri and Drehmann (2010) developed a model in which credit and interest rate risk are measured together. In addition to this study, Drehman and others (2010) reached a conclusion that the impact of credit and interest rate risk should be measured jointly. Furthermore, Esposito and others (2015) found that the interest rate risk was significantly correlated to liquidity risk for Italian banks.

Research and Application: Turkish Banking Sector

Data and Methodology

In this study, we aimed to define the determinants of interest rate risk of Turkish banks. Within this context, annual data for the periods between 2004 and 2014 for 20 deposit banks of Turkey. Because Bank of Tokyo-Mitsubishi UFJ Turkey, Odea Bank and Rabobank were newly established in Turkey and Adabank is not an active deposit bank because of the legal problems with its owners, these 4 banks were excluded in this study. Moreover, the details of interest rate risks were not stated in the financial reports of Tekstil Bankası, Alternatifbank and Citibank. Owing to this aspect, these banks were not also included in the analysis. In addition to them, SPSS 22 program was used in the analysis process. The details of these banks are emphasized below.

Table 2: List of Banks Analyzed in this Study

Bank Name	Asset Size (% of total banks)
Türkiye Cumhuriyeti Ziraat Bankası	13.1
Türkiye Halk Bankası	8.2
Türkiye Vakıflar Bankası	8.4
Akbank	10.9
Anadolubank	0.5
Fibabanka	0.4
Şekerbank	1.1
Turkishbank	0.1
Türk Ekonomi Bankası	3.3
Türkiye Garanti Bankası	11.6
Türkiye İş Bankası	12.6
Yapı ve Kredi Bankası	9.6
Arap Türk Bankası	0.2
Burgan Bank	0.5
Denizbank	3.7
Deutsche Bank	0.2
Finans Bank	4.0
HSBC Bank	1.8
ING Bank	2.0
Turkland Bank	0.3
Total	**92.5**

Source: *Turkish Banking Association*

Variables

As an independent variable, we used interest rate risk of the banks. There are different methods of calculating interest rate risk in the literature. The details of them were emphasized on the table below.

Table 3: Calculation of Interest Rate Risk

Calculation of Interest Rate Risk	Reference
Change in net interest margin	Campos et. al. (2016), Esposito et. al. (2015), Abdymomunov and Gerlach (2014), Memmel (2014), Bagenau et. al. (2012), Nawalkha and Soto (2012)
Total Interest Earning Liabilities/Total Interest Paying Assets	Ruprecht (2013), Ho and Saunders (1981), Saunders (1994),
Maturity mismatch between assets and liabilities (Amounts of Assets*Time to Maturity - Amounts of Liabilities*Time to Maturity) / Total Amounts of Asset	Van den Heuvel (2001), Gambacorta and Mistrulli (2004), Gambacorta (2008), Sukcharoensin (2013), Kaufman (1984), Bacha (2004), Lee and Stock (2000), English et. al. (2013)
(The amount of assets mature within 1 year - The amount of liabilities mature within 1 year)*Short-term Interest Rate	Mishkin and Eakins (2009), Kashyap and Stein (1995), Kashyap and Stein (2000), Campello (2002), Landier et. al. (2015)

Source: *Authors*

In this study, we decided to use the ratio of interest sensitive liabilities to interest sensitive assets of the banks within 1 year. We calculated the average value of the banks for each year. After that, we gave the

value of "1" for the banks that are higher than the average. On the other hand, dependent variable of other banks took the value of "0". In other words, the value of "1" represents the situation of higher interest rate risk.

Table 4: Independent Variables Used in the Study

Variables	**Calculation**
Net Interest Margin	(Interest Income – Interest Expense) / Total Assets
Total Loans	Log value of total loans
Total Assets	Log value of total assets
Total Deposits	Log value of total deposits
Capital	Log value of total capital
Derivatives	Total Derivatives / Total Loans
Return on Assets	Net Profit / Total Assets
International Interest Rate	USD Interest Rate
Non-performing Loans	Non-performing Loans / Total Loans
Growth Rate	$(GDP_t – GDP_{t-1}) / GDP_{t-1}$
Exchange Rate	USD Exchange Rate
Short-term External Debt	Short-term External Debt / Total Reserves
Inflation	$(CPI_t – CPI_{t-1}) / CPI_{t-1}$

Source: *Authors*

The table above demonstrates the 13 explanatory variables used in this study. We provided these variables from the website of World Bank. Net interest margin equals to the difference between interest income and interest expenses (Maudos and De Guevara, 2004). Therefore, we expect that there is a positive relationship between net interest margin and interest rate risk. Similar to this variable, increase in total loans, total assets and total deposits shows the risky situation, so there should be direct relationship between interest rate risk and these variables.

Capital is the amount of the banks that can be used during unfavorable conditions. Thus, it decreases interest rate risk. Parallel to this aspect, since derivatives can be used in order to hedge interest rate risk, we expect negative relationship. In addition to them, there should also be negative relationship between return on assets and interest rate risk owing to the same reasons. Moreover, since increase in international interest rate, non-performing loans, exchange rate, short-term external debt and inflation raises the volatility, we expect positive relationship between interest rate risk and these variables. Nevertheless, because growth rate shows the positive condition, there should be inverse relationship.

Logit Model

In logit model, dependent variable takes two different values, such as "yes-no". The main difference of logit model is the usage of logistic distribution model. The details of this model are given on the equation below.

$$F(Y_i) = 1 / (1 + e^{-Yi}) = 1 / (1 + e^{-(B0 + BiXi + \varepsilon i)}) \quad (1)$$

In this equation, "Y" shows dependent variable. Additionally, "X" represents independent variable. Moreover, "B" explains coefficient of independent variables while "ε" demonstrates error term. Furthermore, it can also be said that this equation always takes positive values because the value of "e" equals to 2.72 (Albert and Chib, 1993). In addition to this situation, the denominator of the equation will always be greater than the numerator because "e" is greater than "0". Owing to this situation, this equation always takes value between "0" and "1". Therefore, logit analysis is useful when dependent variable takes two different values.

In logit analysis, first of all, unit root test for independent variables is performed. The main reason for this situation is that data should be stationary in order to be used in the analysis. Otherwise, there is a risk of spurious regression (Granger, 1969). In this analysis, Augmented Dickey Fuller unit root test is used. The equation of this test is given below.

$$\Delta Y_t = \alpha + \gamma Y_{t-1} + \sum_{k=1}^{n} \beta_k \Delta Y_{t-k} + \varepsilon_t \quad (1)$$

In this equation, "ΔYt" refers to the first difference of the series. In this analysis, we evaluate whether "γ" equals to “0” or not. If it equals to “0”, this means that there is not a unit root and the variable is stationary (Granger, 1969).

In addition to unit root test, another important subject for logit method is multicollinearity analysis. The first condition of this analysis is that VIF values of all variables should be less than “10” (Wheeler, 2007). Another criterion is that the ratio of highest and lowest eigenvalue should be less than “1,000” (Alibuhtto and Peiris, 2015). Moreover, the last condition is that all conditional index values should be less than “30” (Wheeler, 2007).

There are many studies in the literature by using logit analysis. Yüksel and others (2015) used logit model in order to analyze the relationship between CAMELS ratios and credit ratings of deposit banks in Turkey. Zengin and Yüksel (2016) tried to define the influencing factor of liquidity risk for Turkish banks with the help of logit method. Moreover, Demirgüç-Kunt and Detragiache (1998) and Gerni and others (2005) used logit model in order to predict financial crisis.

Analysis Results and Findings

In order to analyze the determinants of interest rate risk for Turkish banks, firstly, we made unit root tests for 13 explanatory variables so as to understand whether they are stationary or not. The details of unit root tests were given below.

Table 5: Unit Root Test Results

Variables	**Unit Root Test Results**	
	Level Value (Probability)	**First Difference Value (Probability)**
Net Interest Margin	0.0040	-
Total Loans	0.0007	-
Total Assets	0.5650	0.0000
Total Deposits	0.0000	-
Total Capital	0.0000	-
Derivatives	0.6775	0.0000
Return on Assets	0.0051	-
International Interest Rate	0.0000	-
Non-performing Loans	0.0000	-
Growth Rate	0.0000	-
Exchange Rate	0.9939	0.0000
Short-term External Debt	1.0000	0.0000
Inflation	0.0007	-

Source: *Authors*

As it can be seen from the graph, 9 independent variables are stationary on their level values because their probability values are less than “0.05”. On the other hand, it was also identified that 4 explanatory variables (total assets, derivatives, exchange rate and short-term external debt) are not stationary, so the first differences of these variables were used in the analysis. In addition to the unit root tests, the results of logit analysis were detailed on table 6.

Table 6: Logit Results

Variables	**Coefficient**	**Significance Value**
Total Assets	-4.962	0.123
Total Deposits	**0.457**	**0.000**
Total Capitals	**-0.229**	**0.000**
Derivatives	0.045	0.515
USD Interest Rate	-0.143	0.401
Growth Rate	0.021	0.726
Short-term External Debt	-3.242	0.188
Nagelkerke R^2 = 0.318 Dependent Variable: Interest Rate Risk		

Source: *Authors*

In the analysis, 6 independent variables (net interest margin, return on assets, exchange rate, total loans, inflation rate, non-performing loans) cannot be used due to the multicollinearity problem. Additionally, it was also defined that 5 variables do not affect interest rate risk because their significance values are higher than “0.05”. As a result, it was determined that 2 explanatory variables (total deposits, total capitals) are statistically significant since the significance values are less than “0.05”. First of all, it was identified that there is a direct relationship between the deposits and interest rate risks for Turkish banks owing to the positive coefficient (0.457). This situation demonstrates that interest rate risk is higher for the banks that have higher amount of deposits. The main reason behind this aspect is that because the maturity of the deposits is lower, any increase in the interest rate affects banks more severely.

Furthermore, capital is another independent variable which has an impact on interest rate risk of Turkish banks. As it can be seen from the table, the coefficient of this variable is “-0.229”. This value shows that there is a negative relationship between the amount of capital and interest rate risk. In other words, banks that have lower amount of capital expose to higher interest rate risk. The main cause of this aspect is that the amount of the capital can be used in recession period. Therefore, higher capital amount decreases interest rate risk for Turkish banks. Moreover, it was also identified that Nagelkerke R2 value is 0.318.

With respect to the multicollinearity analysis, it was determined that VIF values of all variables are less than “10”. In addition to this situation, it was also identified that the ratio of highest (1.89) and lowest eigenvalue (0.01) is less than “1,000”. Moreover, it was also defined that all conditional index values were less than “30”. Therefore, it was concluded that there is not a multicollinearity problem in this analysis.

Conclusions

We tried to determine the influencing factors of interest rate risk in Turkish banking sector in this study. Within this context, 20 deposit banks in Turkey were analyzed. Moreover, annual data for the periods between 2006 and 2015 was evaluated in the study. In addition to this situation, panel logit model was used in order to achieve this objective.

First of all, we made panel unit root tests for explanatory variables. It was determined that 9 independent variables are stationary on their level values. However, it was also identified that 4 explanatory variables (total assets, derivatives, exchange rate and short-term external debt) are not stationary. Thus, the first differences of these variables were used in the analysis.

In addition to stationary analysis, we also controlled whether there is a multicollinearity problem or not. In this analysis, it was determined that VIF values of all variables are less than “10” and all conditional index values were less than “30”. Moreover, it was also identified that the ratio of highest (1.89) and lowest eigenvalue (0.01) is less than “1,000”. Therefore, it was concluded that there is not a multicollinearity problem in this study.

According to the results of panel logit analysis, it was defined that 2 explanatory variables affect interest rate risk of Turkish banks. Firstly, it was identified that there is a positive relationship between the amount of deposits and interest rate risks for Turkish banks. This situation explains that banks, which have higher amount of deposits, are exposed to higher amount of interest rate risk.

In addition to this issue, it was also determined that there is a negative relationship between the amount of capital and interest rate risk. That is to say, banks that have lower amount of capital face with higher interest rate risk. The main cause of this situation is that banks can use the amount of the capital in recession period. Thus, it can be said that higher amount of capital decreases interest rate risk for Turkish banks.

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